



Harmful Algal Blooms (HABs) in NJ's Freshwaters

Victor Poretti, Section Chief

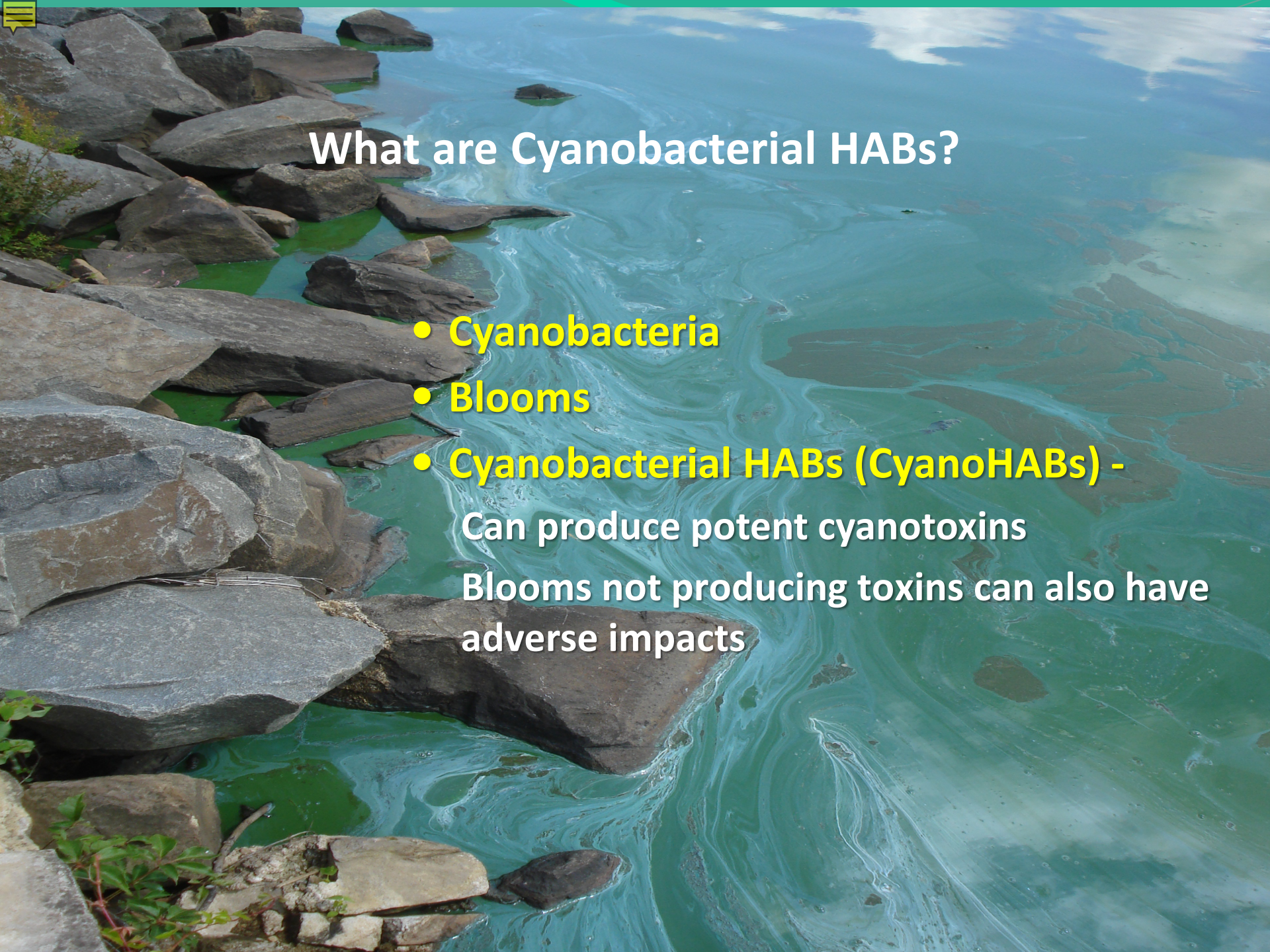
Bureau of Freshwater & Biological Monitoring (BFBM)
Division of Water Monitoring & Standards
Department of Environmental Protection

HAB RFP 1 Information Session
December 20, 2019

Overview

- HAB Basics
- DEP HAB Recreational Response Strategy
- DEP HAB Website
- 2017 - 2019 HAB Responses
- Advanced Technology





What are Cyanobacterial HABs?

- **Cyanobacteria**
- **Blooms**
- **Cyanobacterial HABs (CyanoHABs) -**
 - Can produce potent cyanotoxins
 - Blooms not producing toxins can also have adverse impacts



What are the Risks?

Humans:

Adverse effects can include: Flu-like symptoms, rash, allergic reactions, or more serious liver, kidney or nervous system impacts.

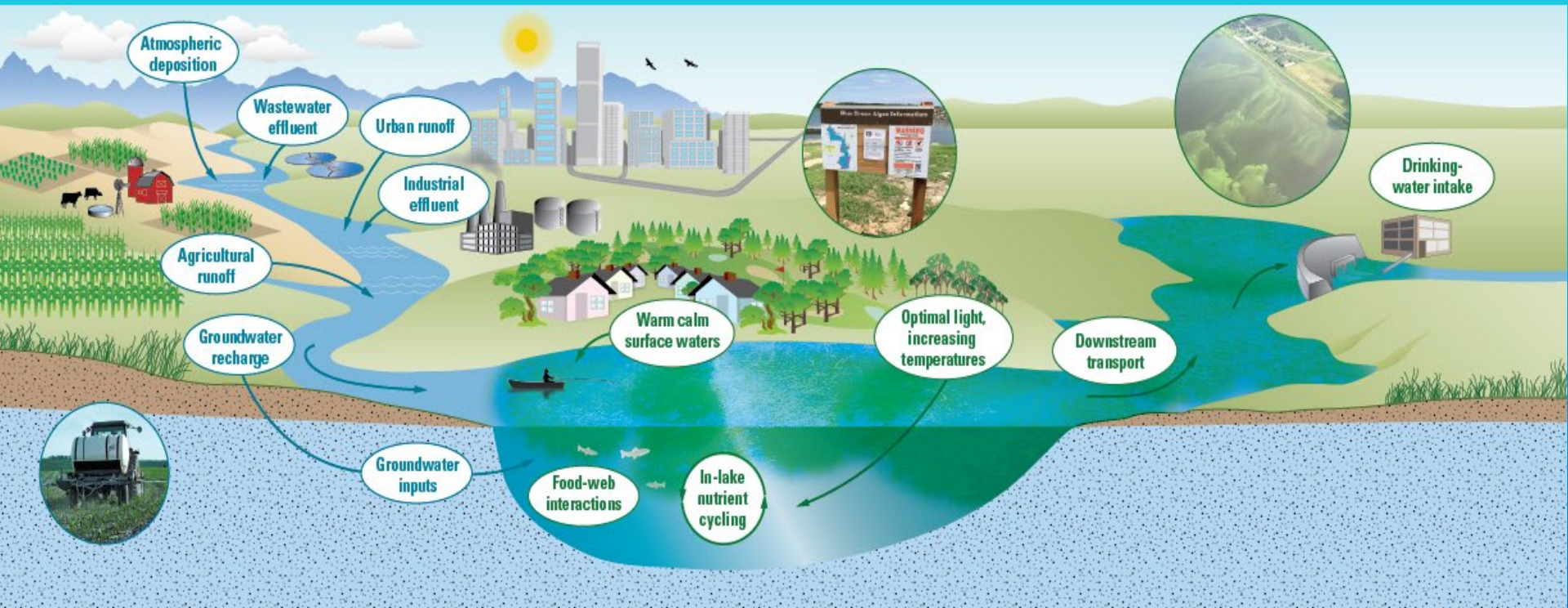
Animals:

Many cases of wildlife, pets, and livestock sickness and death.

Background

What Causes Algal Blooms?

Many environmental factors influence the occurrence of algal blooms. In general, an algal bloom indicates an ecosystem imbalance.



Cyanobacterial Harmful Algal Blooms (HABs) Freshwater Recreational Response Strategy

- Unified approach for HAB response in recreational waters & sources of drinking water.
- Defines response actions of Departments and programs
 - DEP, DOH (Licensed bathing beaches) and Dept Ag
 - Coordinated by DEP's Bureau of Freshwater & Biological Monitoring
 - DEP programs include: BMWWM, DSR, DWSG, DPF & DFW



NJ Cyanobacterial Harmful Algal Blooms (HABs) Freshwater Recreational Response Strategy - Released 2017

- RECREATIONAL THRESHOLDS –
Cell density and 3 toxins (NJ DEP
Division of Science and Research
and World Health Organization
recommendations)
- HAB MONITORING & RESPONSE
- ADVISORIES
- RESEARCH
- OUTREACH & COMMUNICATION



NJ Department of Environmental Protection
Division of Water Monitoring and Standards
Bureau of Freshwater & Biological Monitoring

Cyanobacterial Harmful Bloom (HABs) Freshwater Recreational Response Strategy



Revision 1.0
June 2018

Reporting and Response

NJDEP Hotline:

Environmental Emergency?
1-877-WARN-DEP
1-877-927-6337

Environmental Non-Emergency?

Try our new
WARN NJDEP
mobile app



HAB Button – NJDEP Homepage

<https://www.state.nj.us/dep/hab/>

CyanoHAB Page

<https://www.state.nj.us/dep/wms/bfbm/CyanoHABHome.html>

HAB RESPONSE

If State owned water body or drinking water source –

DEP/BFBM directs sampling and analysis response

Any bathing beach or youth camp - DEP notifies local HD and State DOH.

NJDEP/BFBM will direct response coordination.

If other water body -DEP will notify appropriate local government agency and seek partners for sampling and reconnaissance.



NO SWIMMIN

Note: licensed bathing beaches are under NJDOH regulation. New Jersey State Sanitary Code Chapter IX Public Recreational Bathing N.J.A.C. 8:26

HAB Website Enhancements

HABs Website

<https://www.state.nj.us/dep/hab/>

Governor Phil Murphy • Lt. Governor Sheila Oliver

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Division of Water Monitoring and Standards

Bureau of Environmental Analysis, Restoration and Standards

Bureau of Fresh Water & Biological Monitoring

Bureau of Marine Water Monitoring

Beach Programs

Harmful Algal Blooms (HABs)

AmeriCorps NJ Watershed Ambassadors

Barnegat Bay

Outreach

Events

NJ Water Monitoring Council

Related Links

[HABs Information](#) | [Freshwater Response Strategy](#) | [Report a HAB](#) | [Freshwater HABs Events](#) | [Fact Sheets](#)

[Governor's 2019 HABs Initiative Announcement](#)

[Governor's 2019 HABs Initiative Factsheet](#)

[HABs Related Grants](#)

Harmful Algal Blooms

Visit the [CyanoHABs page](#)

[HABs Recreational Response Strategy](#)

[Report a HAB in New Jersey](#)

Basic HAB Information:



Photo Credit: NJDEP

CyanoHABs Health Effects (Human and Animal):



Photo Credit: NJDEP

Managing HABs in Recreational Waters:



Photo Credit: NJDEP

New Jersey CyanoHABs Events:



Managing HABs in Drinking Water:



Monitoring and Analysis:



Research and Collaboration:



Prevention and Treatment:



Photos and Other Resources



CyanoHABs Website

://www.state.nj.us/dep/wms//bfbm/CyanoHABHome



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AMNET Benthic Macroinvertebrate Sampling

Fish Monitoring

CyanoHABs

Lake Monitoring

Rivers & Streams Chemical Monitoring

Groundwater Quality Monitoring

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NJ HAB Response Strategy Document

Bureau of Freshwater & Biological Monitoring

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[Governor's 2019 HABs Initiative Announcement](#)

[Governor's 2019 HABs Initiative Factsheet](#)

Cyanobacterial Harmful Algal Blooms (CyanoHABs)

Visit the [HABs Main Page](#).

[Report a HAB in NJ](#)

[CyanoHAB Photos](#)



Photo Credit: NJDEP

Cyanobacteria

Also known as blue-green algae, but are not true algae. Naturally present in lakes and streams in low numbers. Can form dense blooms under suitable environmental conditions - sunlight, high nutrients, warm temperatures and calm water

Cyanobacterial Harmful Algal Blooms (CyanoHABs) Blooms:

Can discolor the water or produce floating mats or "scums" on surface. Dissolved oxygen rises when algae or cyanobacteria are in the growth state and respiring, and decreases when algae continue to respire at night. During significant blooms, extreme depletion of oxygen may be detrimental to fish and other aquatic organisms.

Cyanotoxins

- Cyanobacteria can produce toxins that are dangerous for humans, pets, livestock and wildlife.
- The toxins produced by the cyanobacteria are referred to as cyanotoxins.
- Cyanotoxins can be produced by a wide variety cyanobacteria.

Most common toxin producing taxa

- Microcystis and Anabaena.
- Degree of toxicity varies with species and concentrations.
- **Microcystis**: resemble a greenish, thick, paint-like (sometimes granular) material that accumulates along shores. Scums that dry on the shores of lakes may contain high concentrations of microcystin for several months, allowing toxins to dissolve in the water even when the cells are no longer alive or after a recently collapsed bloom.
- **Anabaena**: slimy blooms on the surface. Anabaena blooms may develop quickly and also resemble green or blue-green paint. Some species also form colonies, which are seen as large dark dots in water samples.

Most common cyanotoxins

Based on the surveys that have been carried out to date in U.S. waters, the most commonly identified cyanotoxins are [microcystins](#), [cylindrospermopsins](#), [anatoxins](#) and saxitoxins. Additional information on CyanoHABs, including other states' activities, is available on the [EPA CyanoHABs website](#).

Advanced Website with Interactive Map

The screenshot displays a web application interface for monitoring Harmful Algal Blooms (HAB). The browser address bar shows the URL: `njdep.maps.arcgis.com/apps/webappviewer/index.html?id=4913456e9dcf4d4dbbc30bb50054a668`.

Left Sidebar: NJDEP HAB DASHBOARD

- Info Summary:** HAB Testing (12)
- Report List:**
 - 10/1/2019, 12:28 AM - leigh's desk
 - 10/1/2019, 12:30 AM - 29 arctic
 - 10/1/2019, 12:32 AM - arctic ice cream
 - 10/1/2019, 12:33 AM - home
 - 10/15/2019, 2:23 PM - 123work
 - 10/16/2019, 10:29 AM - WQX-14952 Pemberton Lake
 - 10/16/2019, 7:28 AM - S123bfm
 - 10/16/2019, 8:50 AM - Wall Twp
 - 10/18/2019, 8:56 AM - s123
 - 10/2/2019, 9:04 AM - Leigh desk on iphone
 - 10/9/2019, 9:11 AM - alpha
 - 11/10/2019, 2:04 PM - cvs via desktop

Central Map: A map of the Philadelphia region with a red "DRAFT" watermark. A popup window displays data for a specific sample:

HAB_sample_table: 10	
Site Visit Date and Time	10/16/2019, 10:29 AM
Sample Location	WQX-14952 Pemberton Lake
County	BURLINGTON
Drinking Water Source	No
Bathing Beach	No
Site Visited By	DEP-SFBM
Algal Bloom Observed?	Yes
Sample Taken?	Yes
Sampler Name	Alex Dinkel
Sample Depth Description	Surface grab
Sample Depth (meters)	1.00

Bottom Section:

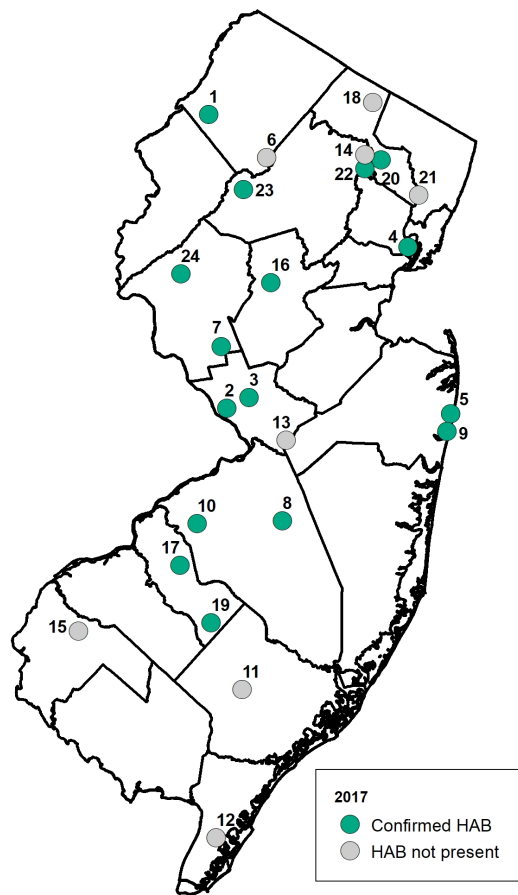
- HAB Report by Date:** A donut chart showing the distribution of reports.
- General Information Postcard:** Two informational posters about Harmful Algal Blooms. One poster includes the text: "What are they? Freshwater harmful algal blooms in rivers, streams or lakes are caused by cyanobacteria. Cyanobacteria, also known as blue-green algae, are not true algae. May form dense blooms under suitable environmental conditions: elevated temperatures, high levels of nutrients and calm water. Can produce toxins that are dangerous for humans, pets."

The Windows taskbar at the bottom shows the system clock as 11:17 AM on 10/25/2019.

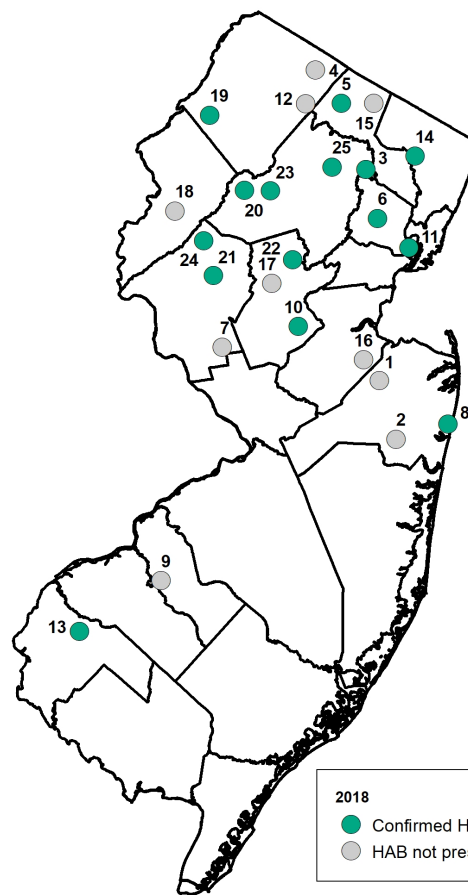


2019 HAB RESPONSE SUMMARY

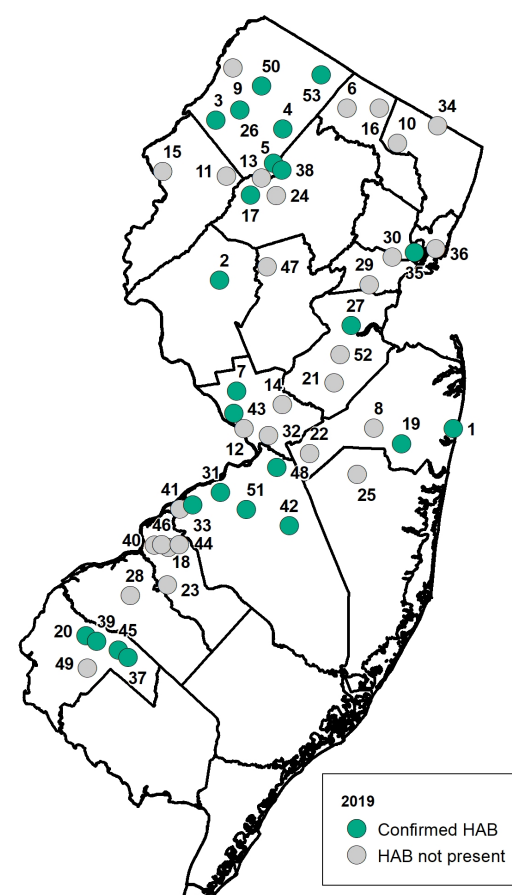
HAB Responses As of Nov 2019 (by Municipality)



Map number corresponds to municipality of HAB occurrence

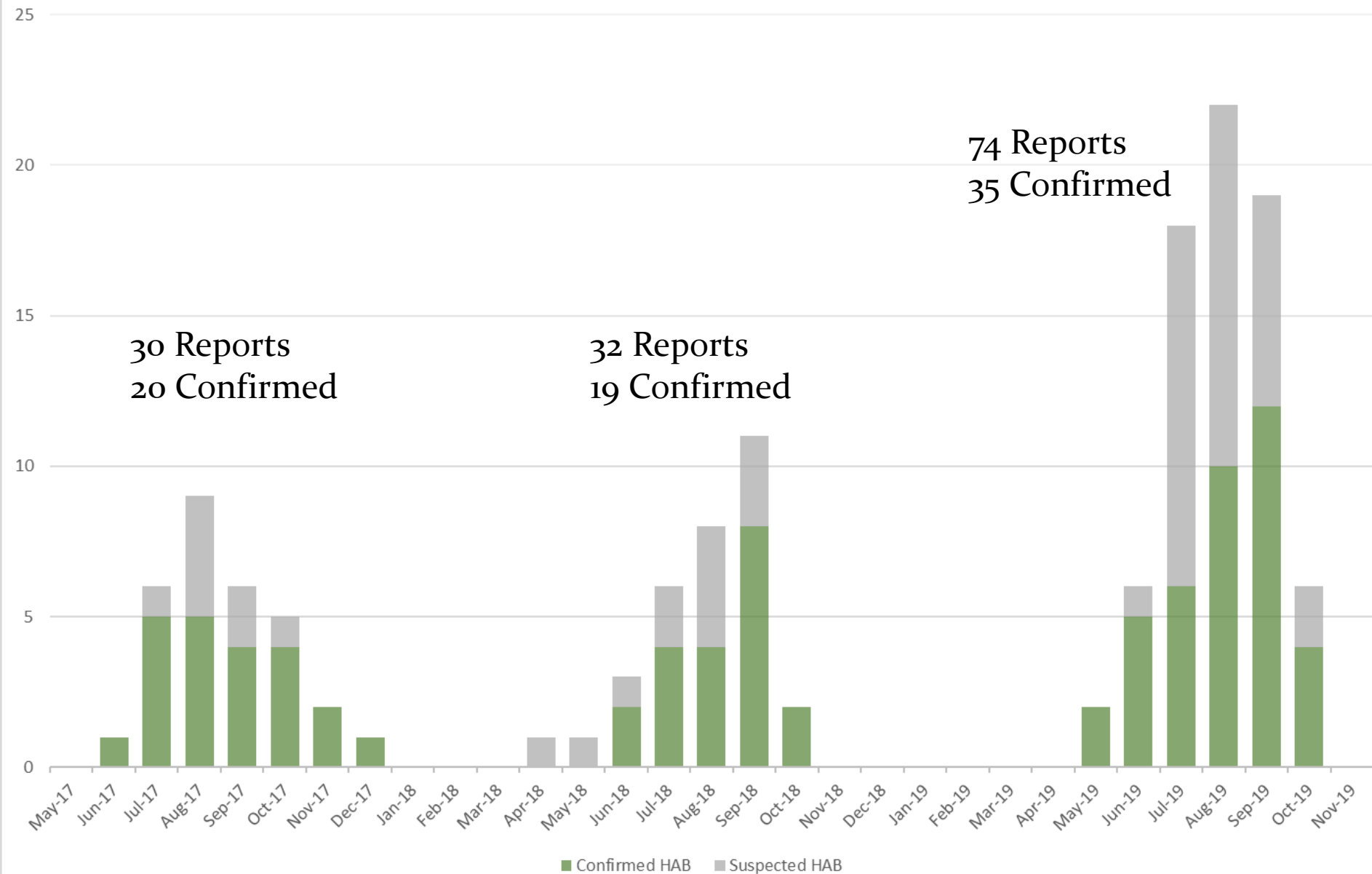


Map number corresponds to municipality of HAB occurrence

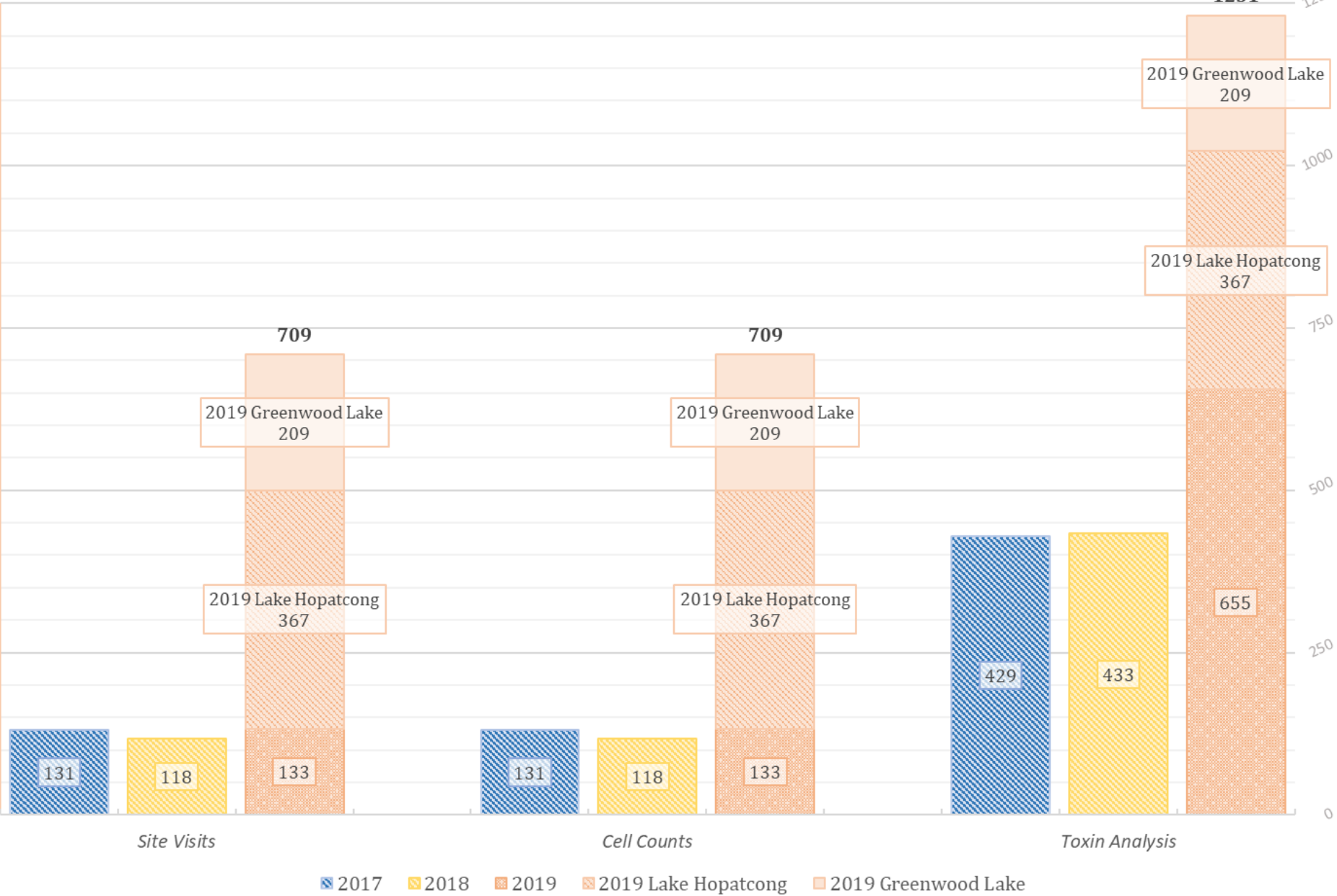


Map number corresponds to municipality of HAB occurrence

WATERBODIES WITH SUSPECTED HAB REPORTS CONFIRMED 2017-2019



2017-2019 BFBM Response and Analysis



Summary As of Nov 2019

- 35 water bodies with confirmed HABs/ 74 responses to suspected HABs reports
- 25 -Bathing Beaches (in season) at 6 waterbodies
 - 18 at Lake Hopatcong
 - 3 at reenwood Lake
 - 4 other lakes
 - 17⁰% of waterbodies w/ confirmed HABs
- 4 - Drinking Water Sources
- 11⁰% of waterbodies w/ confirmed HABs



Summary (By Waterbody Event) As of Nov 2019

~100% confirmed events above threshold for cell count

Maximum Cell Count Per Event

- 73% > 100,000 cells/ml (Highest 56,300,000)
- 8% 50,000 – 100,000 cells/ml
- 16% 30,000 – 50,000 cells/ml
- 3% 20,000 – 30,000 cells/ml

Maximum Toxin Per Event

- 51 % of water bodies also had microcystins toxin levels above the 3 $\mu\text{g}/\text{l}$ guidance threshold
- 19% 3 to 8 $\mu\text{g}/\text{l}$
- 32% > 8 $\mu\text{g}/\text{l}$ (Highest 1096.5)
- 68% microcystin dominant when toxins > 3 $\mu\text{g}/\text{l}$.



Summary As of Nov 2019

- 49 % increase in confirmed HAB events
- 59 % increase in waterbody responses to reported suspected HABs
- ~500% increase in-lake sites.
- 30% of all water monitoring network samples.
- 1243 toxin analyses performed; ~190% increase
- 709 cell count analyses performed; ~500% increase

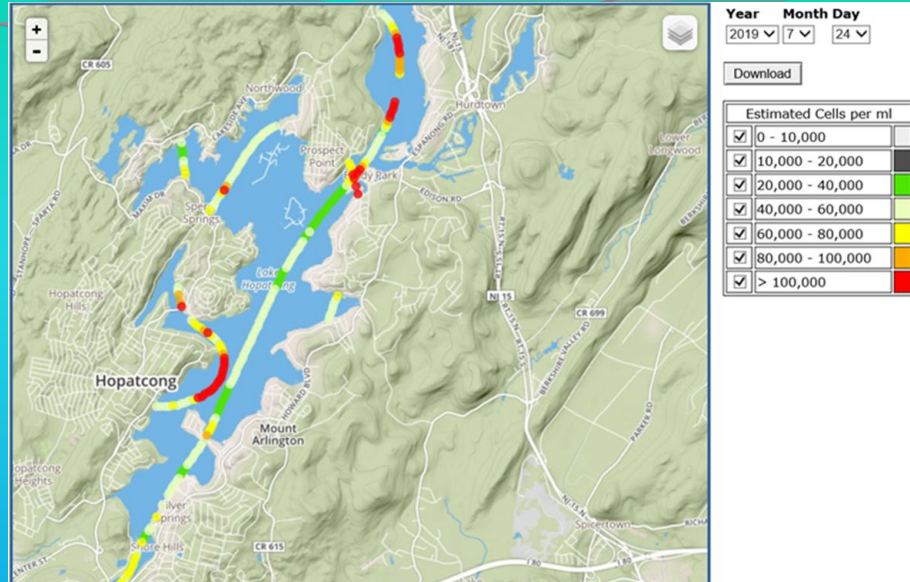


DEP Use of Advanced Technology for HABs

DEP Use of Advanced Technology for HABs



Hand-held phycocyanin meters



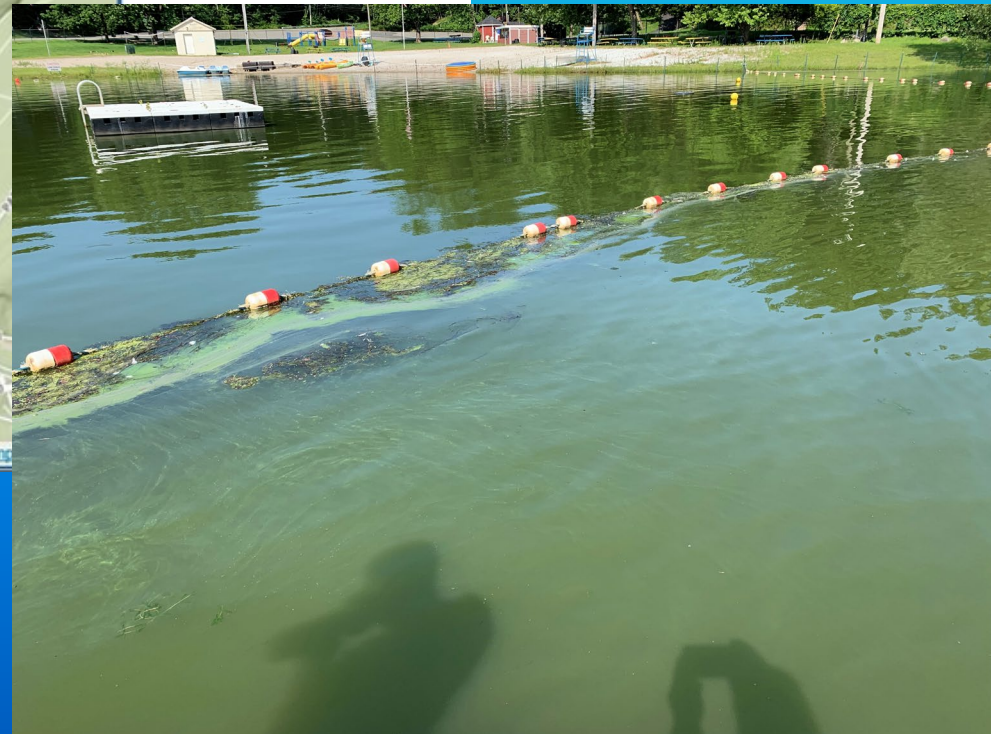
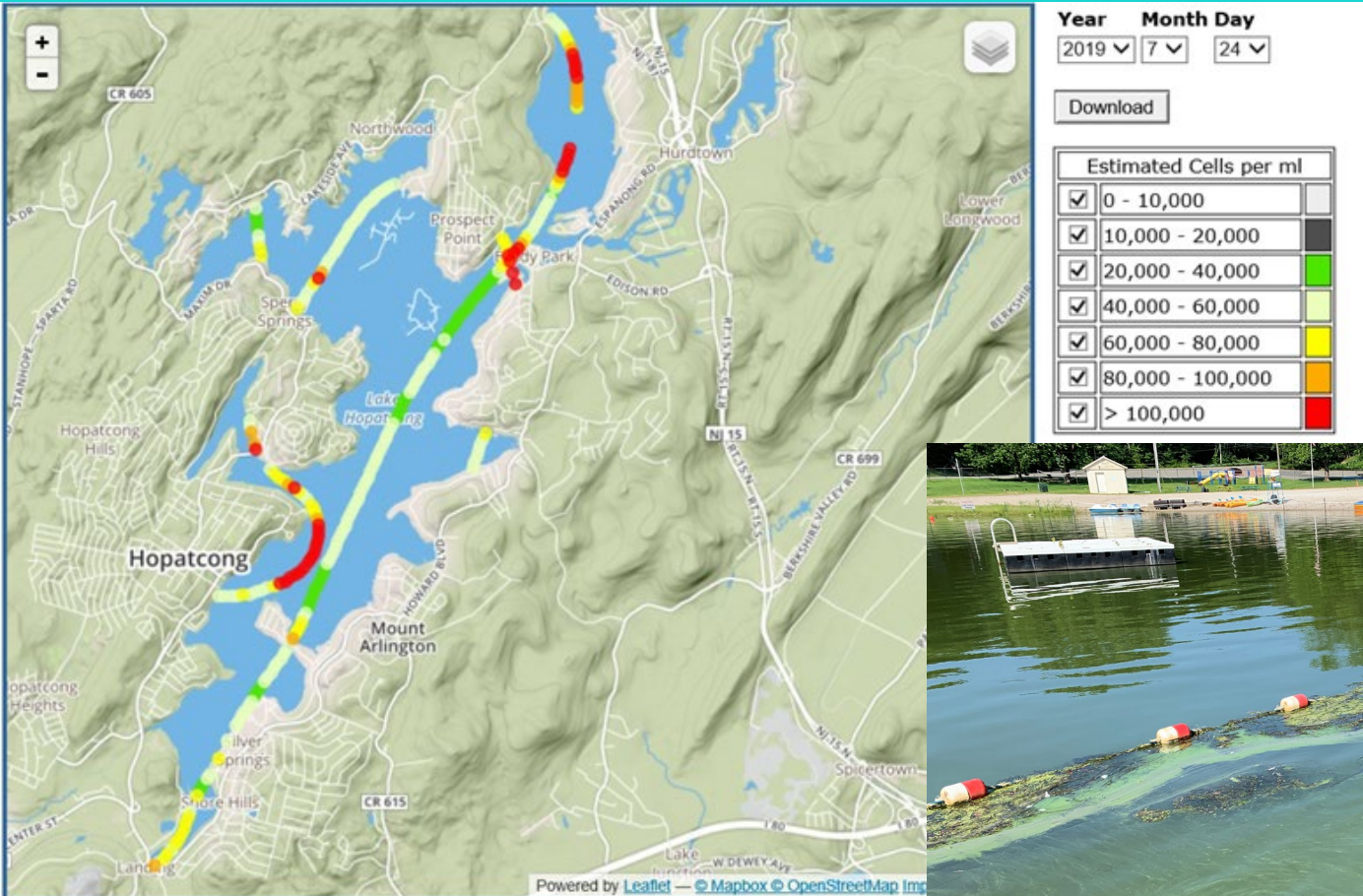
Aircraft remote sensing

Continuous monitoring buoys



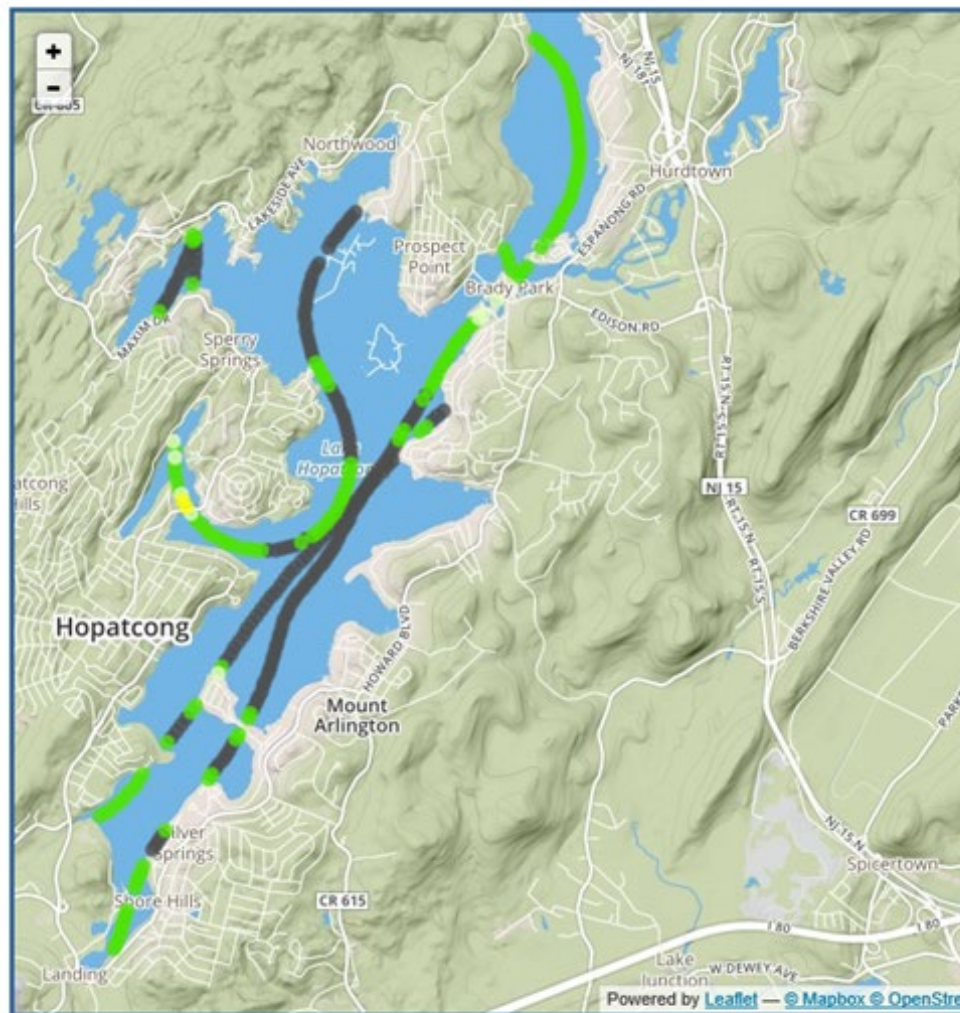
Flight Results

Aircraft Surveillance once/week. Lake Hopatcong



Flight Results

- Aircraft Surveillance once/week



Year Month Day

2019 9 3

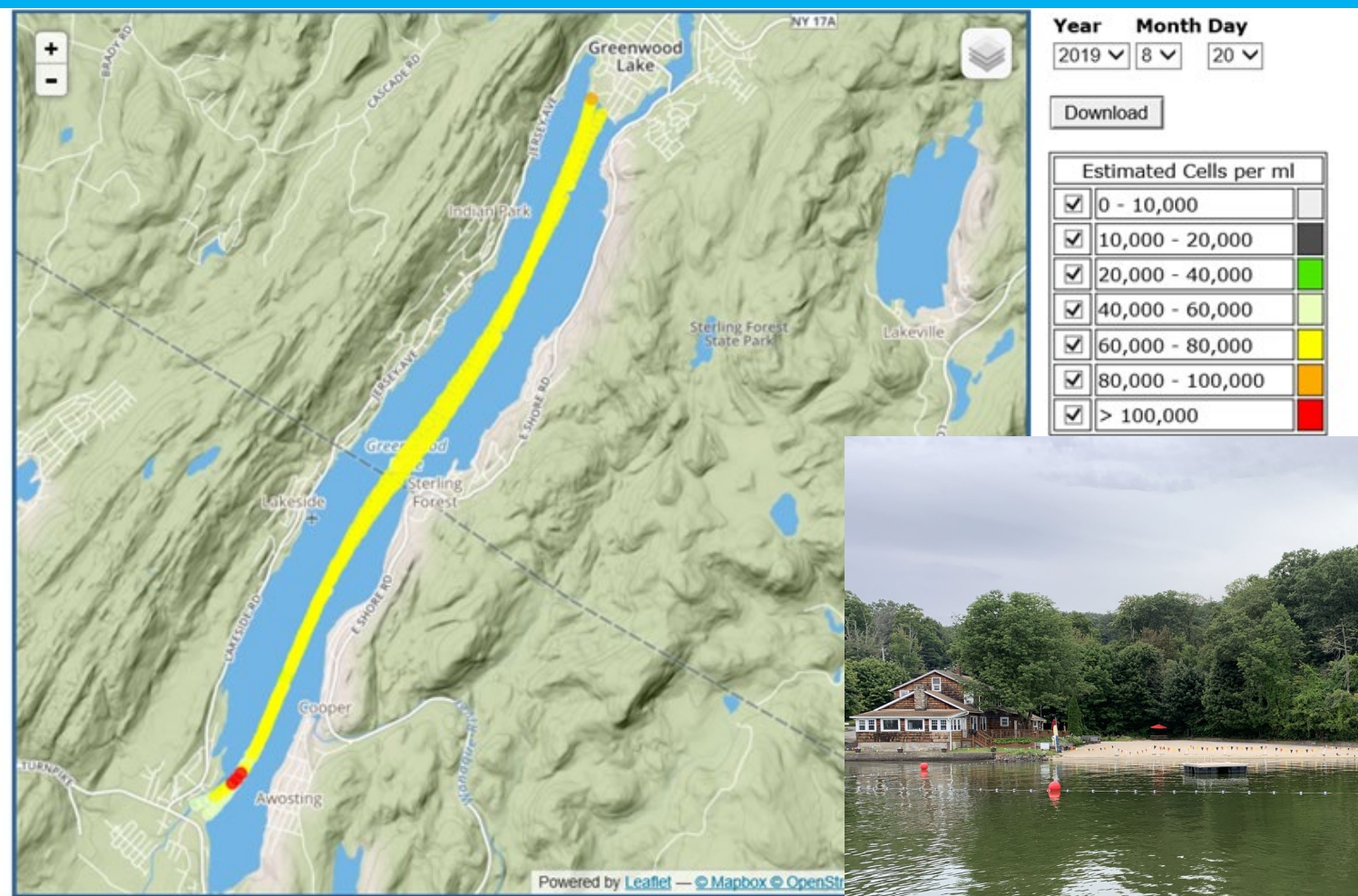
Download

Estimated Cells per ml	
<input checked="" type="checkbox"/>	0 - 10,000
<input checked="" type="checkbox"/>	10,000 - 20,000
<input checked="" type="checkbox"/>	20,000 - 40,000
<input checked="" type="checkbox"/>	40,000 - 60,000
<input checked="" type="checkbox"/>	60,000 - 80,000
<input checked="" type="checkbox"/>	80,000 - 100,000
<input checked="" type="checkbox"/>	> 100,000



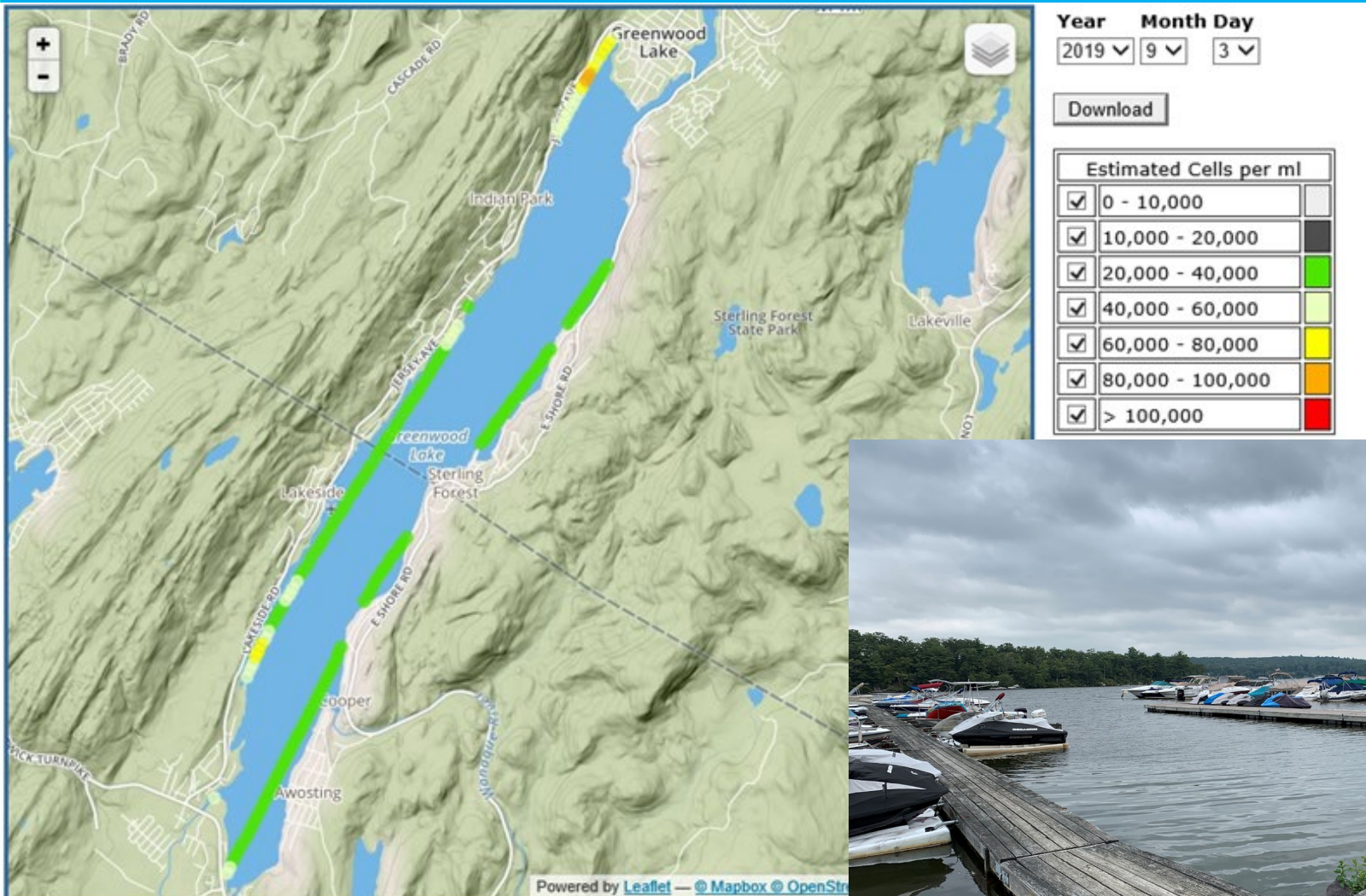
Flight Results

Aircraft Surveillance once/week. reewood Lake

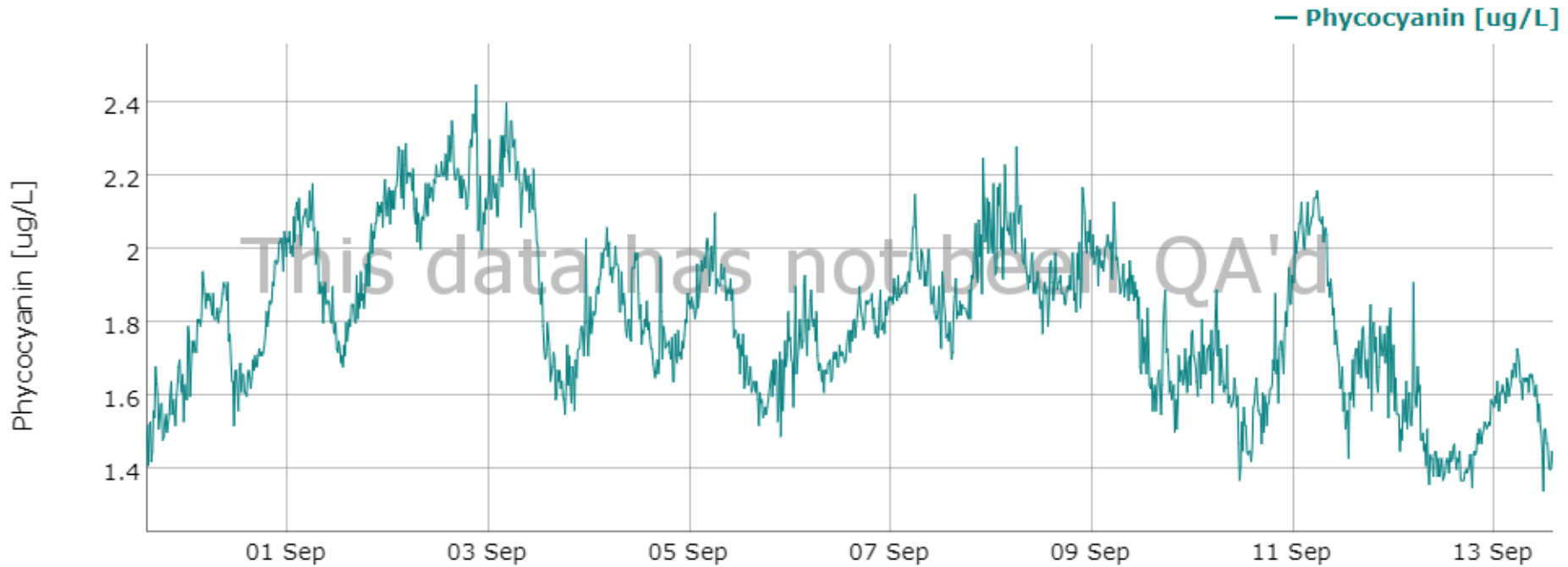


Flight Results

- Aircraft Surveillance once/week



DEP Use of Advanced Technology for HABs



Lake Hopatcong Continuous Phycocyanin Levels 9/1 –

9/13/2019

Readings every 5 min

Hourly data will be available:

<http://njdep.rutgers.edu/continuous/>



Contact Information

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Monitoring

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BFBM Website -

<https://www.state.nj.us/dep/wms//bfbm>

HAB website -

<https://www.nj.gov/dep/HAB>

BFBM CyanoHABs website -

<https://www.state.nj.us/dep/wms//bfbm/CyanoHABHome.html>